

CLAIMS:

1. A carrier for an immobilized molecule, said carrier comprising a solid or semi-solid support which is labeled with an identifiable code molecule that permits the differentiation of one such labelled carrier from another carrier in a heterogeneous population of said carriers.
2. The carrier of claim 1 wherein said immobilized molecule is a known nucleic acid molecule.
3. The carrier of any one of claims 1 or 2 wherein said code molecule is a peptide, that can be distinguished on the basis of molecular mass.
4. The carrier of any one of claims 1 to 3 wherein said carrier further comprises a chemical linking moiety which is capable of forming a chemical bond with a nucleic acid molecule.
5. The carrier of claim 4 wherein said chemical moiety comprises a thiol, carboxyl or amine group.
6. A nucleic acid molecule bound to or otherwise attached to said carrier of any one of claims 1 to 4.
7. The carrier of claim 1 wherein said immobilized molecule is a non-nucleic acid molecule and said code molecule is a nucleic acid which can be distinguished on the basis of nucleotide sequence.
8. The carrier of claim 6 wherein said immobilized molecule is a putative protein-binding molecule.
9. The carrier of claim 7 or 8 wherein said nucleic acid molecule is attached via a chemical linking moiety.

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10. The carrier of claim 9 wherein said chemical moiety comprises a thiol, carboxyl or amine group.

11. The carrier of any one of claims 1 to 5 and 7 to 10 wherein said code or immobilized nucleic acid molecule is attached by a covalent bond between a chemical moiety on said surface of said carrier and a chemical moiety conjugated to said nucleic acid code molecule *via* a carbon atom spacer, having a structure mC_n wherein n is the number of carbon atoms and is from 1 to about 100 and m is number of repeats of said C_n molecule and is from about 1 to about 10.

12. The carrier of any one of claims 1 to 5 and 7 to 11 wherein either said code or said immobilized nucleic acid code molecule may be transcribed and/or comprises an RNA polymerase promoter sequence or functional fragment thereof.

13. The carrier of claim 12 wherein the RNA polymerase promoter sequence is an SP6 RNA polymerase promoter sequence or functional fragment, homolog, analog, derivative thereof.

14. The carrier of any one of claims 1 to 5 and 7 to 13 wherein said solid or semi-solid support is a microparticle.

15. A population of carriers of any one of claims 1 to 5 and 7 to 14 wherein said population comprises one or more distinct classes of carrier on the basis of the attached code molecule.

16. A method for producing a plurality of carriers including a population of carriers having detectably distinct code molecules, said method comprising:

- (i) preparing a plurality of carriers having different code molecules wherein each code molecule is associated with a respective carrier;
- (ii) subjecting the nucleic acid molecules to nucleic acid-based reactions to enable incorporation of detectable labels into the immobilized nucleic acid

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molecules;

- (iii) identifying carriers having distinctive code molecules that are detectably and/or quantifiably decipherable or resolvable by the detection/quantification means;
- (iv) identifying carriers having similar to non-distinctive code molecules; and
- (v) sorting carriers having distinctive code molecules from the carriers having non-distinctive code molecules to thereby provide a plurality of carriers including a population having detectably distinct code molecules.

17. The method of claim 16 wherein said carrier is a carrier of any one of claims 1 to 5 and 7 to 14.

18. The method of any one of claims 16 and 17 wherein said nucleic acid molecules detectable label is attached *via* hybridization of a labeled primer or probe, optionally followed by amplification from said primer or probe.

19. The method of any one of claims 16 to 18 wherein said detectable label is a fluorescent label.

20. The method of any one of claims 16 to 19 wherein sorting of said fluorescently labeled carriers according to the fluorescent label is performed using flow cytometry.

21. The method of any one of claims 16 to 20 wherein identification of said carriers having said distinctive code molecule is performed using mass spectroscopy.

22. The method of claim 16 wherein said molecule of each carrier is identified by an indirect or direct method for determining said nucleotide sequence of the nucleic acid molecule.

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23. The method of claim 22 wherein said nucleotide sequence is determined using an assay selected from the group consisting of amplification of the sequence or part thereof, *in-vitro* transcription, restriction fragment length determination, automated or manual sequencing.

24. A method for simultaneously detecting nucleotide polymorphisms in two or more subjects, said method comprising: amplifying or otherwise isolating a potentially polymorphic genetic sequence from two or more subjects in a population; binding the resultant polynucleotides from each subject to a uniquely coded carrier of any one of claims 1 to 5; competitively hybridizing one or more differentially labeled probes or primers to the carrier bound nucleic acid, wherein each probe or primer is specific for a polymorphic variant; optionally performing an amplification reaction primed from the bound primer(s) or probe; sorting the population of carriers according to the bound label; and identifying a particular carrier present in each distinct labelled group on the basis of the molecular mass of the code molecule; thereby associating particular subjects with a particular polymorphic sequence variant.

25. A method for identifying small molecule ligands of a protein, said method comprising: producing or acquiring a library of putative ligands of the protein of interest; attaching each member of the library to a differentially coded carrier of any one of claims 7 to 13; contacting the population of carriers with a labeled protein; sorting of the population by presence or absence of the bound label; and identification of the carriers that bind the subject protein by elucidation of the nucleotide sequence of the nucleic acid code; and thereby identification of a ligand of the protein by association of a library member with a particular code.

26. The method of claim 24 or 25 wherein said carrier comprises a microsphere.

27. The method of any one of claims 24 to 26 wherein said label is a fluorescent label.

28. The method of any one of claims 24 to 27 wherein said carriers are sorted using flow cytometry and/or Fluorescence-Assisted Cell Sorting (FACS).

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29. A kit comprising one or more coded carriers of any one of claims 1 to 5 and 6 to 15 in compartmental form, said kit comprising one or more compartments containing one or more coded carriers, and optionally one or more compartments containing other reagents necessary for the use of said coded carriers, together with instructions for the use of said carriers.

30. A computer program product for assessing the codes on individual or groups of coded carriers, the product comprising:

- (i) code that receives as input values, the code associated with a carrier;
- (ii) code that compares said carrier code to provide assessment of the identity of carriers from a reference database; and
- (iii) a computer readable medium that stores the codes.

31. A computer for assessing codes on carriers wherein said computer comprises:-

- (i) a machine-readable data storage medium comprising a data storage material encoded with machine-readable data, wherein said machine-readable data comprise values for the identity of codes on carriers;
- (ii) a working memory for storing instructions for processing said machine-readable data;
- (iii) a central-processing unit coupled to said working memory and to said machine-readable data storage medium, for processing said machine readable data to compare said values to provide an assessment of the identity of codes from a reference database; and
- (iv) an output hardware coupled to said central processing unit, for receiving the results of the identity of the codes.

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